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ABSTRACT

This paper describes the implementation of data conferencing to provide visual stimuli to students in the Homebound Program, a college degree program designed to accommodate students who are unable to come to campus for classes. The data conference system, a simpler, more cost effective alternative to video conferencing, transmits still images as opposed to the moving images of a video conference. During the lecture, the remote student "audio attends" via speakerphone. The teacher writes or draws on the input tablet; the image is displayed on the teacher's computer monitor and is projected on a screen for the students in the classroom, while the host broadcasts the image via the network to designated workstations. Hardware and software requirements are listed, and how to set up the system is described. A figure illustrates the data conferencing system. (AEF)

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A Virtual Classroom for the Homebound Student

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A virtual classroom for the homebound student

Background Information

I was somewhat puzzled when I was informed that a student who registered for one of my courses would “attend” without stepping into the classroom. Welcome to the Homebound Program, a program designed to accommodate students who wish to enroll in a college degree program but are unable to come on campus. “*You will call the student using the speaker phone,*” I was told, “*That’s how we bring the classroom to the student*”. So that is what I did. Just before a class would begin, I would place a call and the student would listen to the lecture.

Problem recognition and analysis

Throughout the semester the well-known proverb “*a picture is worth a thousand words*” became a real life experience for me. Trying to describe to my homebound student something that I had drawn on the chalkboard or demonstrated using a projector took a lot of time and effort. After a plethora of words, at best the student would reply “*I think I got it, but please send me somebody’s notes of today’s lecture...*”. Soon it became obvious that the missing visual link was placing my remote student at a big disadvantage. Hence I began searching for feasible solutions, implementations that would transmit to my distant student the same stimuli that my other students were exposed to. Since my remote student had audio access to the classroom but no video, video conferencing seemed to be the solution. However video conferencing is very expensive and technically difficult to implement. I had to come up with an implementation that would provide the same benefits as the video conferencing, yet would be cost effective and easy to implement. By defining the concept of *student stimuli* in terms of concrete processes, such as:

- a. “audio attendance” - the remote student should hear and participate in the classroom dialogue,
- b. “image exposure” - the remote student should “see”
 - i.) whatever the instructor writes or draws on the chalkboard
 - ii.) presentations and demonstrations etc..

a well defined framework emerged and the notion of a data conference system seemed a very promising alternative to video conferencing.

The Data Conferencing Solution

Data conferencing, the idea of data sharing and data collaboration, is inexpensive and simple compared to video conferencing. A data conference system transmits “*still images*” contrary to the moving images of a video conference. Although a “still image” might not simulate the classroom happenings as well as a moving image, a data conference system along with its still image transmission has its merit as a teaching tool. After all, if the instructor writes a definition or draws an image on the chalkboard, it is not the hand movement during the process of writing that benefits the students but the product itself. In addition the simplicity of the data conference system stems from the fact that it transmits “still images” and as such is inexpensive and easy to use. Furthermore the data conference implementation described below utilizes technology and equipment that you

might already have access to, such as a Local Area Network (LAN) , multimedia PC with projector, remote access software, etc. Although there are data conference packages available from various vendors; they cost more than the implementation described below. Commercial data conference products are designed for 10 or more people and my objective was to accommodate one or two remote students in each class. Furthermore, the "*audio - attendance*" component had been attained by using the speaker phones already installed in the classrooms. The missing "*image exposure*" component is easy to understand and simple to implement because it is based on commonly used software and hardware items.

The use of the telephone in the classroom to orally communicate with my remote students covers the "*audio attendance*" component and it is self explanatory. The "*image exposure*" part is a bit more complex but still easy to comprehend. In order to use this data conference I had to adapt to some technological directives. Objects for example that I used to write or draw on the chalkboard I now write or draw on a tablet. The image of whatever I write or draw is displayed on a personal computer monitor and projected on a screen for my local students. Simultaneously though the same projected image disseminates to the Local Area Network and is viewable by the workstations. Since my remote students have a dial-up connection to the network they can view the projected/disseminated text or drawn image. This real time image distribution makes up the "*image exposure*" stimuli.

The Data Conference process

- i. Prior to the beginning of the lecture,
 - a. the "Host" feature of Carbon Copy or PcAnywhere software is activated on a workstation/PC;
 - b. the instructor logs-in to the Local Area Network from the classroom computer, loads the "Client" feature of the Carbon copy or PcAnywhere, and connects to the "Host";
 - c. the instructor calls the remote student(s) and establishes a conference call;
 - d. the remote student dials into the "Host PC/ LAN workstation".
- ii. During the lecture,
 - a. the remote student "audio attends" via the telephone, listens and asks questions in the same matter as the other students in the classroom;
 - b. the instructor writes or draws on the input tablet. The image is displayed on the instructor's computer monitor and is projected on a screen for the students in the classroom; at the same time the "Host" broadcasts the image via the network to designated workstations. Since the remote student is connected to the network, that same image is displayed on the remote student's monitor.

The remote student is virtually in the classroom and exposed to the same learning stimuli as the local students. The data conference concept provides the desired result while keeping cost minimal by utilizing technology that may already be available but not fully utilized.

Hardware and Software requirements

Here is a list of the required hardware and software (Some of the components were installed or available at my institution during implementation as the list indicates.)

1. Local area network (LAN) was in place.
2. Cable connection to the LAN from the classroom was available.
3. Multimedia PCs and projection equipment were available.
4. Communication devices and software, PcAnywhere, Carbon Copy, modems, and phone lines were available.
5. A speaker phone for conference calls was accessible in the classroom.
6. A "tablet", which is a computer input device similar in function to the input devices that you are familiar with such as the keyboard and the mouse, was the only hardware necessary to be acquired.

Now that you know what is required , let us set up the system.

- A networked personal computer, equipped with modem(s), and PcAnywhere or Carbon Copy, running the "Host" , allows the "clients" to connect to it either by dial-up or via the Local Area Network (Figure A).
- A networked personal computer, the classroom PC, with PcAnywhere or Carbon Copy, running the "Client", equipped with an input tablet device, and connected also to projection equipment is the one used by the instructor to deliver the subject matter (Figure A).
- A networked personal computer equipped with a modem, PcAnywhere or Carbon Copy, running the "Client" , allows the remote student to connect to the "Host" and receive the images, text or drawings, created by the instructor during the lecture (Figure A).

The data conference implementation becomes even simpler, and less expensive, if you have to accommodate only one remote student. There is no need for a network and the network dependent software. In addition, a second telephone line is not necessary if you use a simultaneous voice and data (SVD) modem. SVD modems, which usually come with a microphone and a speaker, transmit voice and data in either direction, assuming that both connected personal computers have compatible SVD modems.

The data conference process works similarly to the one previously described and the only difference is how the voice and data are transferred to the remote student. Simply the remote student, instead of dialing into the local area network, dials into the instructor's computer. The remote access software transmits the image displayed on the instructor's

PC monitor to the remote student's PC. SVD modems not only transfer the video stimuli but the audio as well for a complete virtual remote classroom.

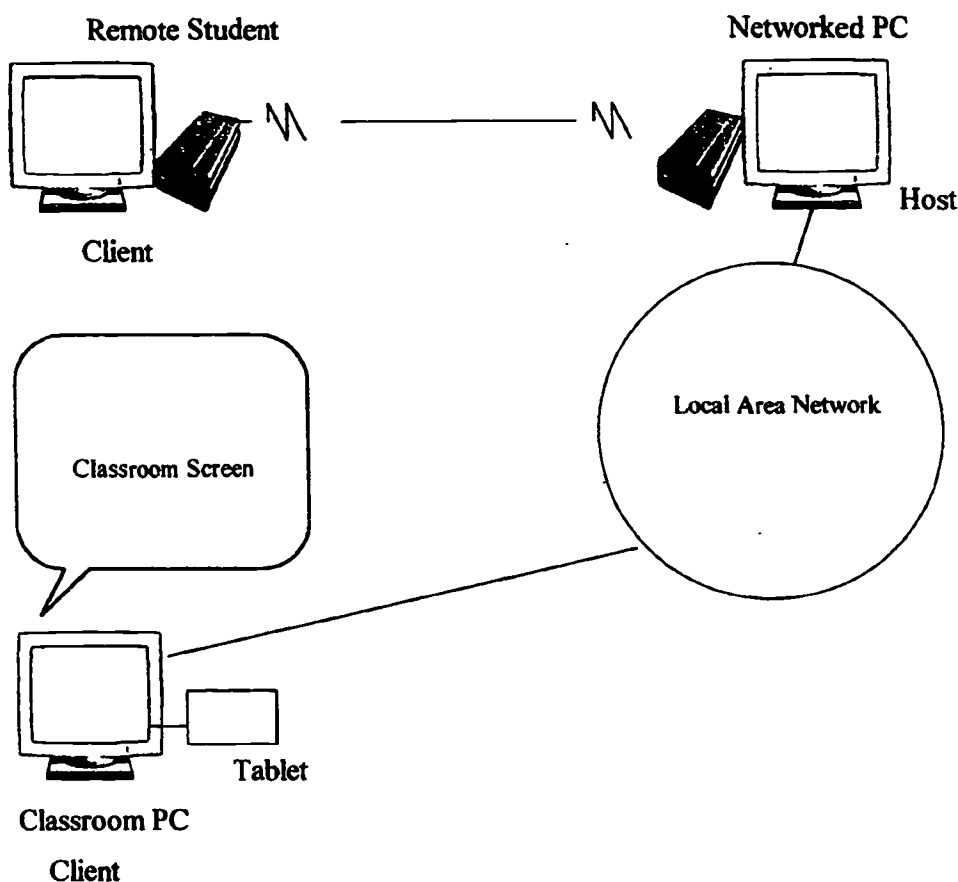


Figure A

Cost and finale

This data conference implementation is a simple and economical solution for creating a virtual classroom and exposing the remote students to the same stimuli to which the students in the classroom are exposed.

How much will this cost?

I am afraid I will leave this question unanswered. Computer and computer related technology prices change quickly. Price volatility is not the reason for not mentioning cost but rather the conviction that the required technology is so common that I bet you already have most or the required components. Furthermore any computer salesperson can give you the cost, and I simply have tried to proclaim that:

If you have any remote students, now you can easily and economically bring the classroom to them by deploying this notion of data conference; it is worth it.